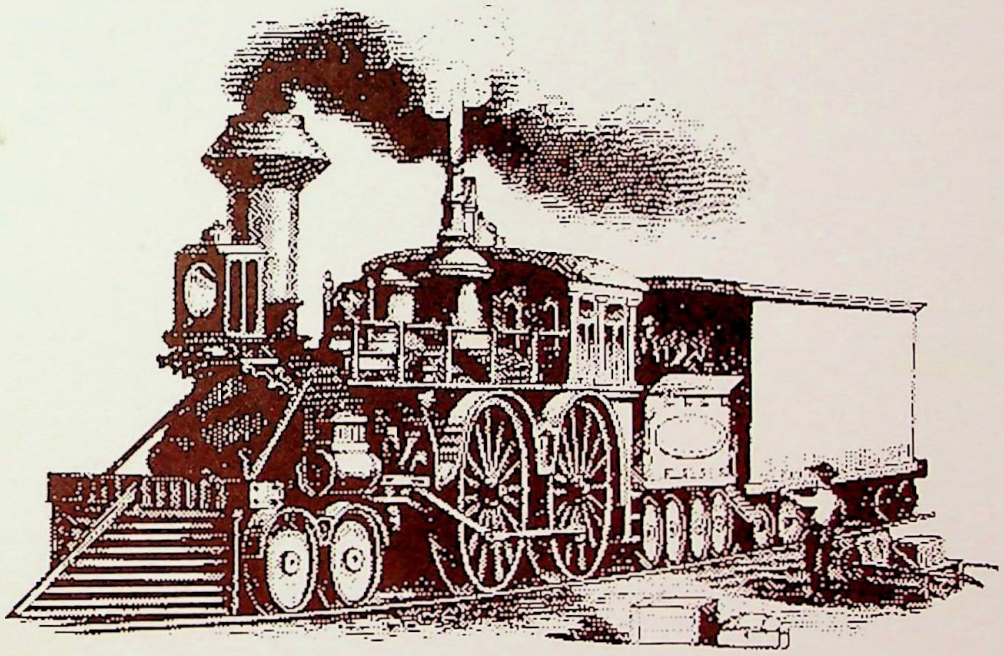
ThunderScan™



High-Resolution Digitizer

for

Macintosh™

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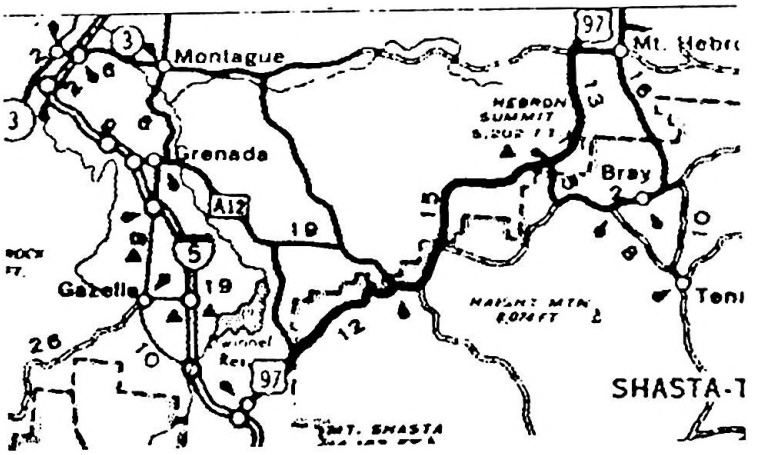
How to Use This Book

You can use this book both as a teacher and as a friend. Some people learn best with teachers, and some with friends.

- If you want a short lesson on using ThunderScan™, you'll find a good teacher in ***Learning ThunderScan***.
- If you want to jump straight into ThunderScan, you'll find a friend to consult in ***Using ThunderScan***. This chapter explains everything you can do with ThunderScan.
- After learning ThunderScan and using it for awhile, turn to ***Reference*** for advanced consultation. You'll find tips, shortcuts, and more technical information that will enhance your work with ThunderScan.

If you're just getting started with Macintosh™, take a look at the Macintosh owner's guide to learn basic Macintosh techniques that you'll use with ThunderScan. You might also want to take a look at the MacPaint™ manual. Once you know how to click, drag, choose commands from menus, and select information, you'll be ready to start using ThunderScan.



About ThunderScan

ThunderScan turns your Macintosh into an electronic darkroom. ThunderScan works with anything you can roll through the Imagewriter printer:

- Forms.
- Logos.
- Photographs and magazine ads.
- Maps.
- Diagrams and sketches.
- Halftones.
- Handwriting and official documents.

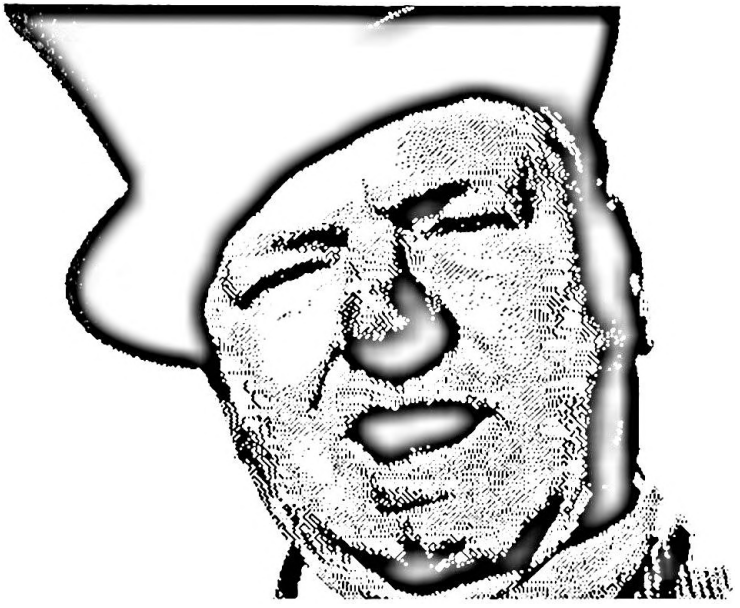
To put the image into the computer, you **scan** it with ThunderScan.

ThunderScan takes an image and remembers all its shades of gray. Then you can make it lighter or darker, change the contrast, copy one part to another. You can make an image negative, erase it, or change it. And you can save the image as a MacPaint document. You can change the MacPaint document with MacPaint's tools or put it into a MacWrite document. (You can copy text into MacWrite this way, but it's only an ***image*** of text, so you won't be able to edit it.)

We won't even try to tell you everything you can do with ThunderScan, but here are some ideas:

- Create collections of clip art.
- Insert illustrations into a report.
- Copy somebody else's drawing, when you can't draw very well.
- Make a copy of a photograph to include in a letter.
- Turn maps, charts, and other teaching aids into computer files in order to make overheads or handouts.
- Illustrate a newsletter you're writing.
- Send an image to another Macintosh, using MacTerminal™.

This manual shows you how to use ThunderScan, but what you use it for is up to you!



Chapter 1: Installation

6 What's Involved

6 Backing Up the Disk

7 Installing the Adapter Box

8 Installing the White Timing Tape

10 Installing the Scanner and Cover

14 Putting an Image into the Printer

15 Focusing

16 Where to Go Next

Installation

You don't have to be a technician to install ThunderScan. You only need one tool: a small screwdriver. You'll also need some basics:

- A Macintosh computer (any size or shape).
- An Imagewriter™ printer set up to work with your Macintosh.

And you'll need these contents from your ThunderScan package:

- The ThunderScan adapter box. The adapter box lets you use either the printer or the scanner by flipping a switch.
- The ThunderScan digitizing cartridge, or **scanner**. It's the device that actually transfers your images from paper into a form your Macintosh can work with.
- The plastic printer cover, to protect your scanner while it's in the printer.
- Velcro™ strips, to hold your scanner cable in place.
- Strips of **white timing tape** to improve scanning.
- The plastic **image carrier** to hold small images for scanning.
- The ThunderScan disk. The ThunderScan disk contains the software that tells the scanner what to do.

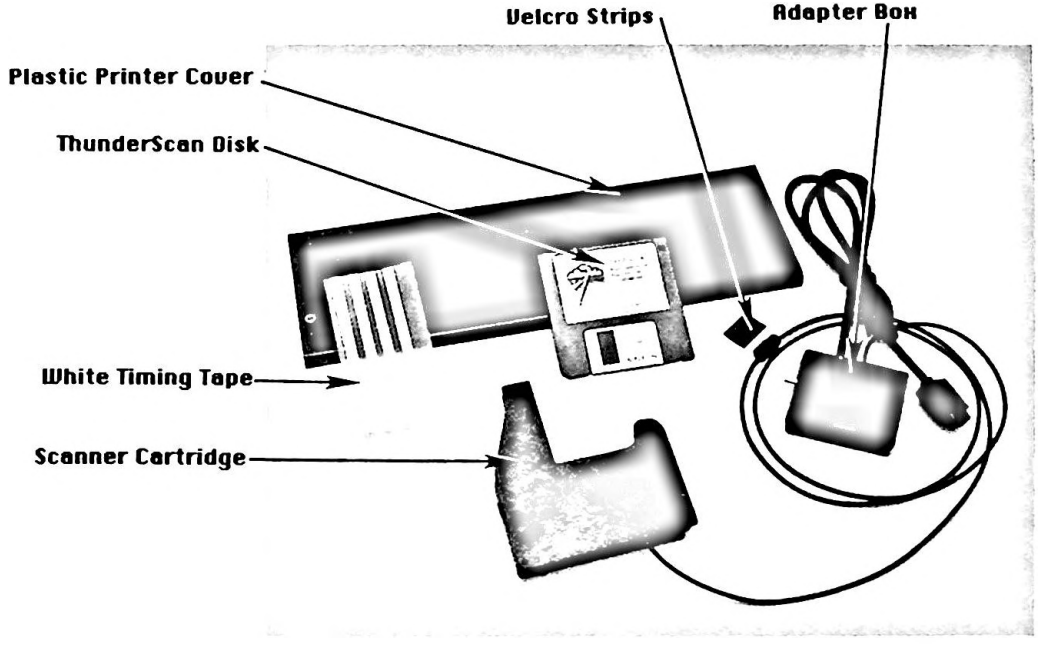


Figure 1

What's Involved

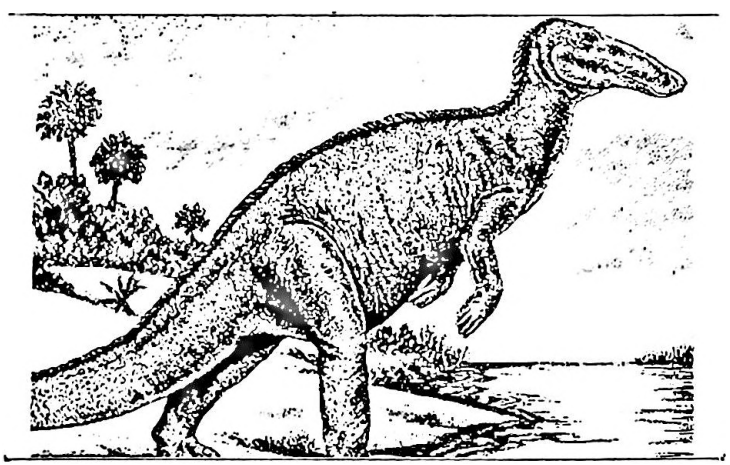
There's really not much to installing ThunderScan. Here's what you'll need to do:

1. Make a backup copy of the ThunderScan application disk.
2. Install the ThunderScan adapter box.
3. Install the white timing tape.
4. Connect up the scanner.

Once you've finished these four steps, you'll be ready to scan your first image.

Backing Up the Disk

Before you do anything else, be sure to make a copy of the ThunderScan application. (That way, you won't have to worry about losing or damaging your original disk.) The Macintosh owner's guide tells you how to make backup copies.



Installing the Adapter Box

ThunderScan shares the printer socket with your Imagewriter through the **ThunderScan adapter box**. You can leave it permanently installed. A switch on the adapter box lets you switch between printing and scanning. To install the adapter box:

1. Make sure your Macintosh and Imagewriter printer are both *turned off*.

2 Disconnect the Imagewriter cable from the **printer socket** on the back of your Macintosh.

3. Plug the cable from the ThunderScan adapter box into the printer socket.

4. Now plug the Imagewriter cable into the socket on the adapter box. Tighten the screws on the connectors so that they don't come loose. (Keeping a tight connection also helps prevent interference with your TV or radio.)

Figure 2 below shows you how things should look when the adapter box is properly connected.

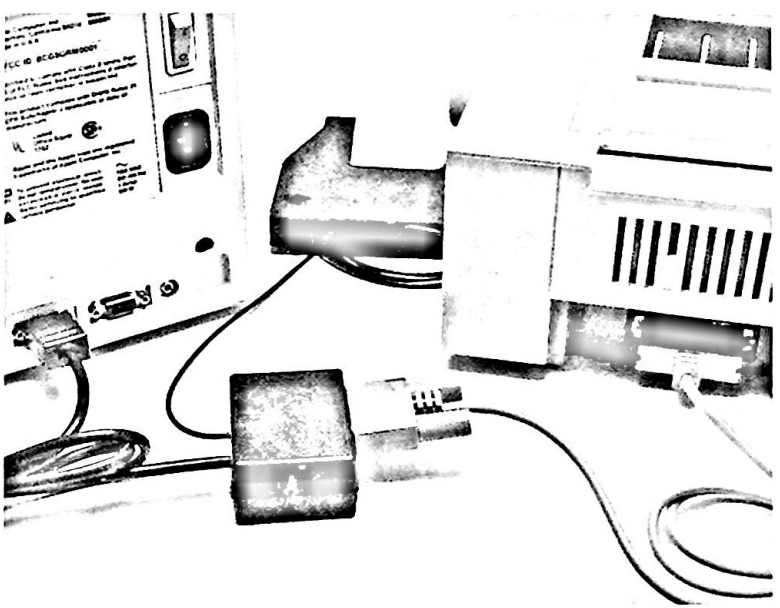


Figure 2

Installing the White Timing Tape

The strips of white adhesive-backed tape that come with ThunderScan allow it to scan faster. You'll need to install one of these strips around the left end of your Imagewriter's platen if you want to take advantage of Thunderscan's highest speed. Several extra strips are supplied in case you want to use ThunderScan on more than one printer. Follow these steps to install the white timing tape:

1. Make sure your Imagewriter printer is *turned off*.
2. Remove the Imagewriter's cover and set it aside.
3. Remove any paper from the printer.
4. Gently move the print head to the middle of the carriage.
5. Peel off a strip of white timing tape from its backing. Stick one end of the tape to the left edge of the platen. Make sure it's even with the edge of the platen. Look at Figure 3 below.

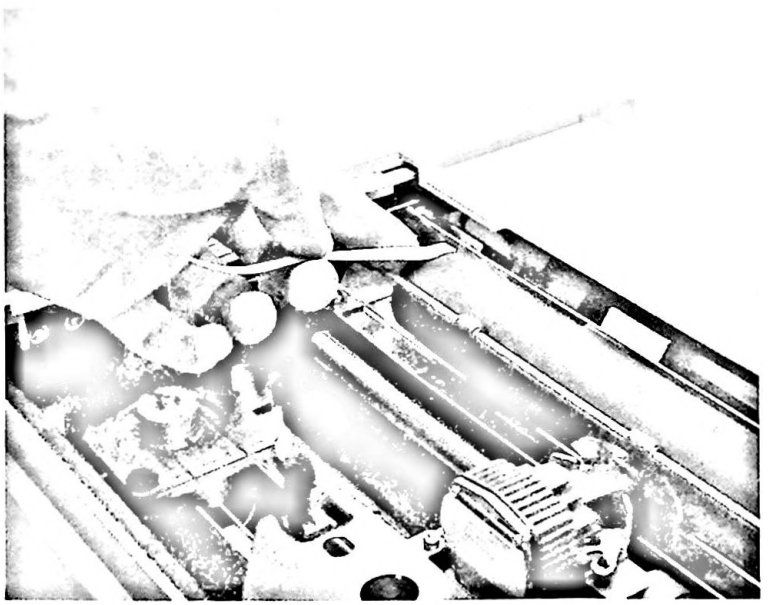


Figure 3 – Installing White Timing Tape

6. Using your left hand to guide the tape, slowly turn the platen knob with your right hand so the tape forms a circle all the way around and and even with the left edge of the platen. Be sure the ends of the tape overlap evenly and that the end of the tape is firmly in place.

7. Check that the tape is even with the left edge of the platen by turning the platen knob and watching the tape. If it's not even, remove it and reapply it carefully. Figure 4 below shows how it should look when you're done.

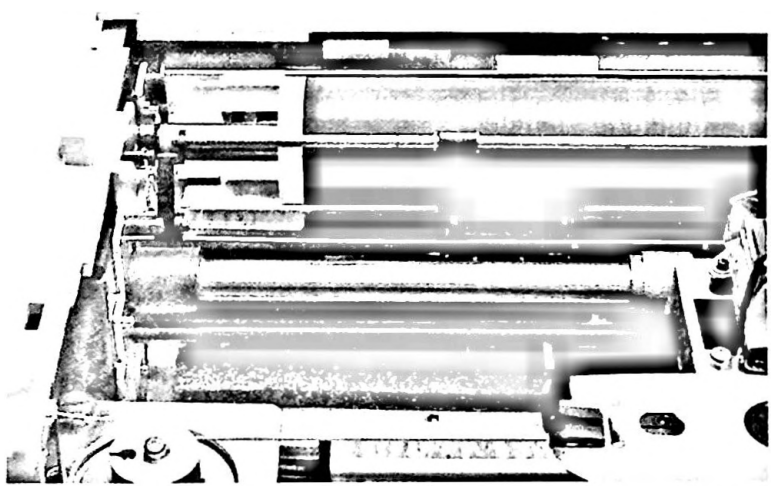


Figure 4 - White Timing Tape Installed

Installing the Scanner and Cover

When you want to scan a document, you simply replace the ribbon cartridge in your Imagewriter with the ThunderScan scanner cartridge. Follow these instructions to install the scanner. After you've done it a few times, you'll find that it only takes a few seconds to get your printer ready to scan.

The scanner itself resembles a printer ribbon cartridge with a cable attached:

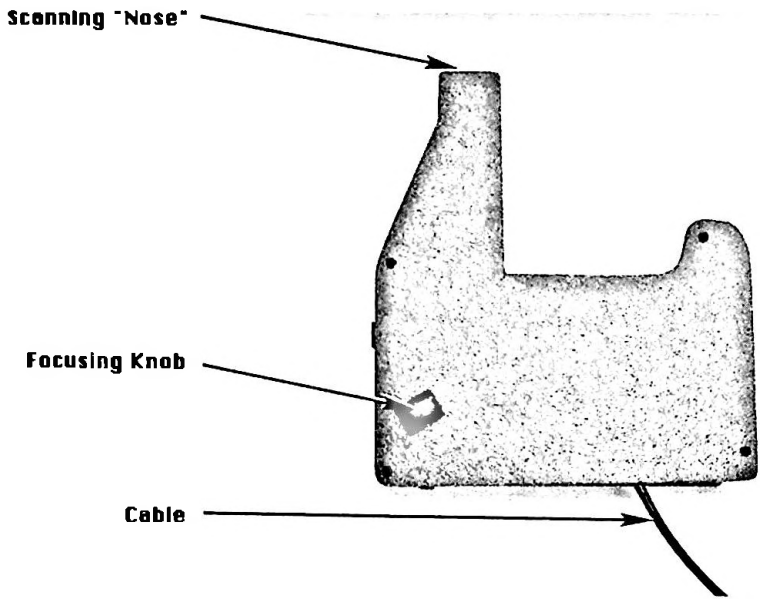


Figure 5

The special plastic printer cover included in the ThunderScan package must be used whenever you have the scanner cartridge installed--it leaves room in the front of your Imagewriter for the scanner cable to move freely.

To install the scanner:

1. Make sure your printer and Macintosh are both *turned off*.

2. Remove the Imagewriter cover and set it aside.

3. Make sure the roller shaft on the printer is against the platen. (The platen is the big roller the paper goes around. The roller shaft holds the paper against the platen.)

4. Gently move the print head assembly to the middle of the carriage (so the print head is under the middle roller of the roller shaft).

5. If there's a ribbon cartridge in your Imagewriter, take it out and set it aside.

6. Take the ThunderScan cartridge with both hands, and with the nose of the cartridge pointed toward the platen and slightly down (so it doesn't bump into the roller shaft), guide it onto the ribbon deck. Look at Figure 6 below.

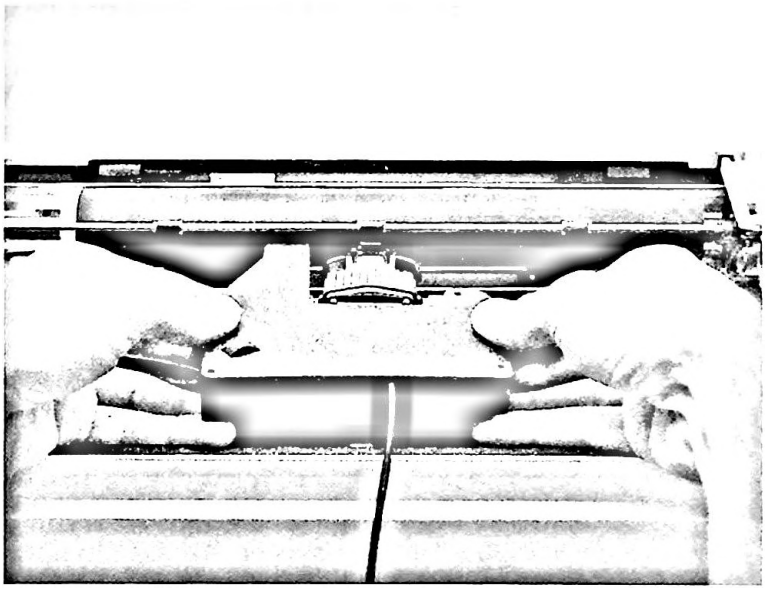


Figure 6 – Installing the Scanner

7. Click the scanner into place. ***Make sure the scanner is firmly in place***. The two ribbon cartridge supporters should snap into the notches on the sides of the ThunderScan cartridge.

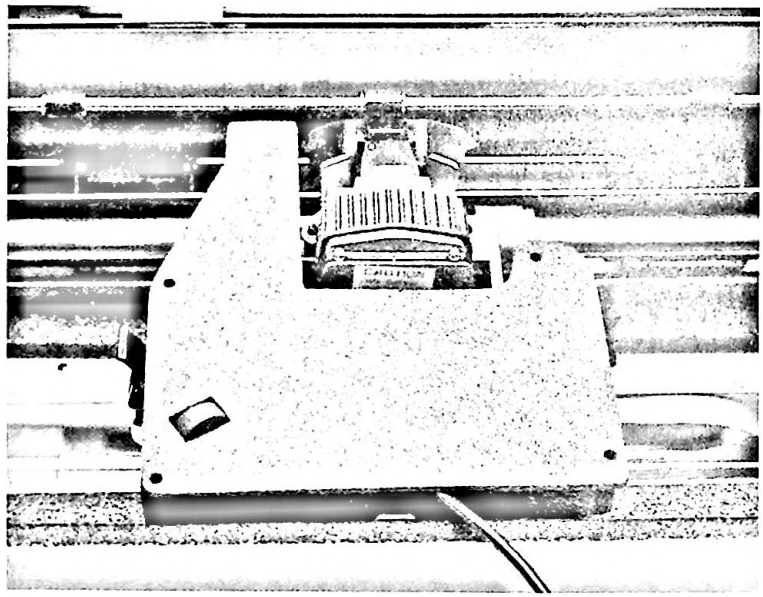


Figure 7

If your scanner won't click into place completely, make sure it isn't caught on something. You may cause ***serious damage*** to the ThunderScan cartridge if you attempt to scan anything without the cartridge firmly in place.

To install the cover:

1. Find the small, square piece of fuzzy Velcro that comes in the ThunderScan package. Remove the backing to expose the adhesive and stick it to the lower left or lower right corner of your Imagewriter (whichever is closer to your Macintosh).

2. Find the piece of Velcro about 18 inches down the cable that comes from the scanner, and press it against the first piece of Velcro you just attached to the front corner of the printer. This will keep the cable in place while you're scanning.

3. Grasp the print head assembly and gently move it as far to the right as it will go, then move it as far to the left as it will go. Make sure that the nose of the cartridge clears the rollers of the roller shaft and that nothing interferes with the cartridge's travel. Make sure that the cable doesn't catch on anything. Leave the cartridge and print head assembly at the far left side of the platen.

4. Take the ThunderScan plastic printer cover and put it on the Imagewriter in place of the regular cover. The small round magnet attached to the bottom on the left side of the cover fits into the circular recess on the top left side of the Imagewriter.

   Note: Never put the regular Imagewriter cover on while you have the ThunderScan cartridge installed. It will damage your ThunderScan cartridge!

5. Make sure the switch on the ThunderScan adapter box is in the **scan** position.

Putting an Image into the Printer

Before you go to the tutorial or scan an image on your own, follow these steps to put your original image into the printer and check the scanner's focus:

1. Remove any printer paper from the printer.

2. Set the release lever in the back position (pin feed). That lets you slide your original in easily.

3. Move the roller shaft toward you, away from the platen.

4. Insert your original. A full page for the scanner begins at the edge-sensing tape. That means you should position your document toward the left edge of the platen. The edge of your document should be about 3/4 of an inch further left than the normal paper position you use for printing. Figure 8 below shows the proper position for your original.

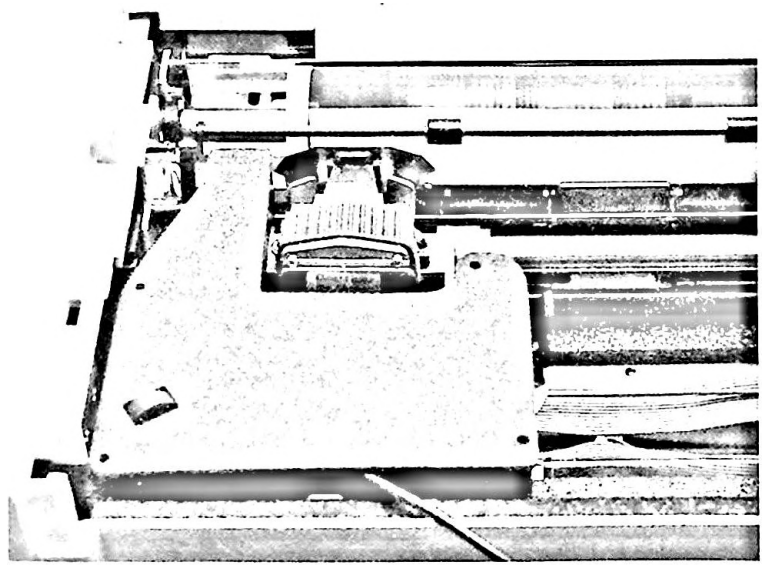


Figure 8

Note: Your original image can be anything that fits into the printer--within reason. If you'd like to work with an image that won't fit into a printer, like a page from a precious book for example, make a photocopy of it. Use the photocopy or a photograph as your original image. See "Troublesome Documents" in the last chapter of this manual for more help.

6. Push the roller shaft back against the platen.

7. Set the release lever in the front position (friction feed).

8. Give a gentle "tug" on the top of the document to make sure it's snug and flat against the platen.

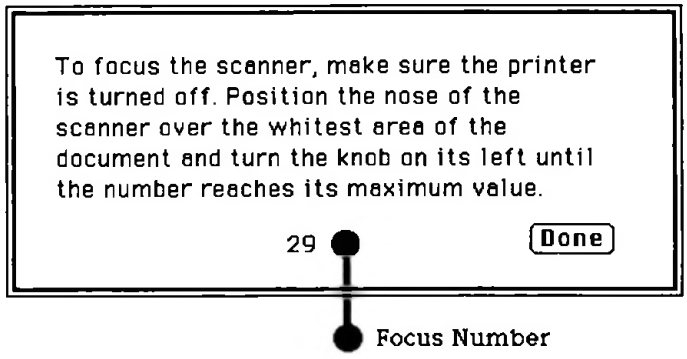
Focusing

Focusing the scanner provides the best response to the paper your image is on. If you change the thickness or type of paper, you should re-focus the scanner.

1. *Turn off* your printer and remove the plastic cover.

2. Put your ThunderScan disk in your Macintosh and **Open** the ThunderScan Application.

3. Choose **Focus** from the **Scanner** menu.


To focus the scanner, make sure the printer is turned off. Position the nose of the scanner over the whitest area of the document and turn the knob on its left until the number reaches its maximum value.
29
Done
Focus Number

4. Position the **scanner cartridge nose** (the pointy part of the scanner) over a white area on your document.

There's a knob on the left side of the scanner.

5. Make the focus number as high as possible by rotating the knob back and forth.

It doesn't matter what the exact number is--it changes depending on the image you're focusing on.

When you're finished focusing,

- ☐ Click on the **Done** box.

You return to the main ThunderScan screen.

5. Replace the plastic printer cover and turn on your printer.

You're ready to scan!

Where to Go Next

For a short lesson on ThunderScan, go to the next chapter, ***Learning ThunderScan***. The lesson gets you started right away scanning an image.

If you want to skip the lesson, ***Using ThunderScan*** tells you how to use each of Thunderscans tools and commands. The ***Quick Reference*** section summarizes the information.

Chapter 2: Learning ThunderScan

20 How to Begin

21 Scanning an Image

24 Playing with ThunderScan

26 Saving

27 Printing

27 Where to Go Next

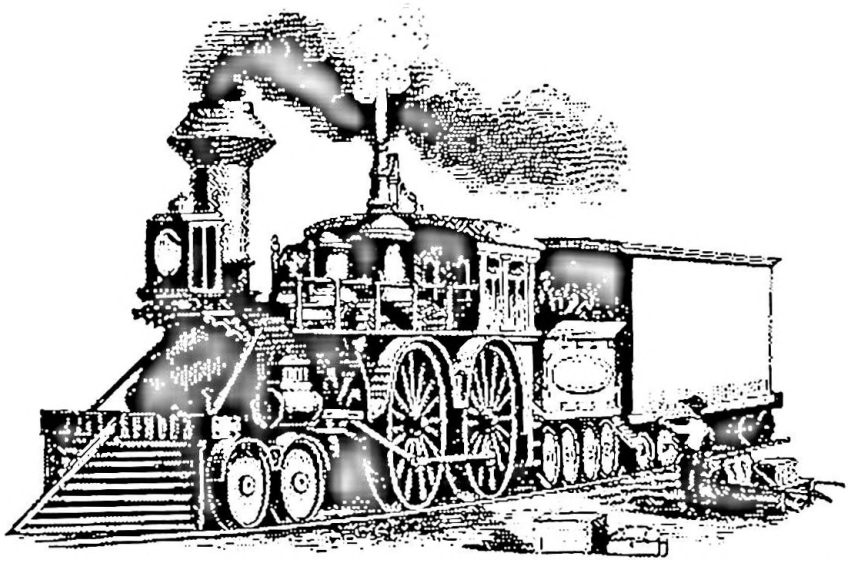
Learning ThunderScan

If you feel ready to scan every loose piece of paper or photograph in sight, you may want to skip this chapter and refer to ***Using ThunderScan*** instead.

But if you want some guidance as you scan your first image, you've come to the right place. In this chapter, you'll find out how to

- Scan an image.
- Play with it.
- Save it.
- And print it out.

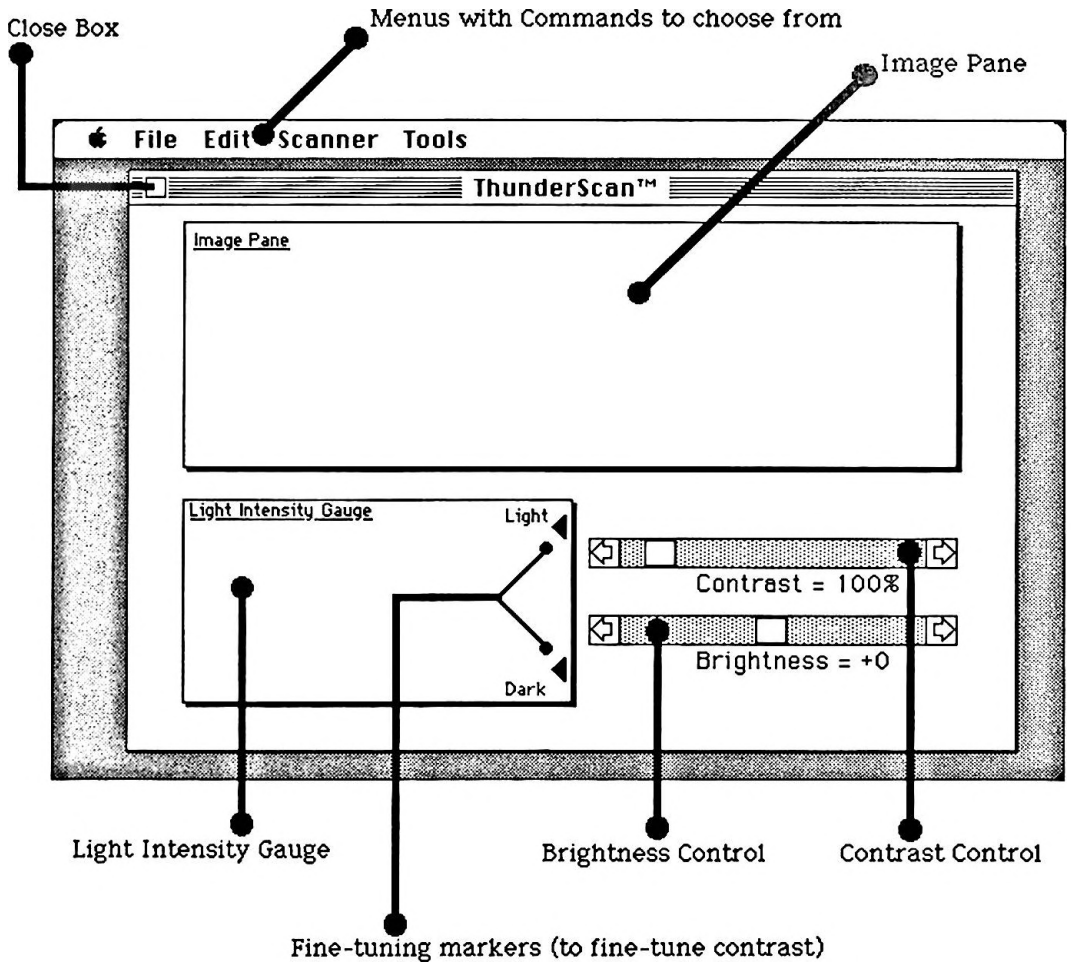
It's as easy as pie!



How to Begin

- ☐ Install your scanner. (The chapter on ***Installation*** shows you how.)
- ☐ Insert the ThunderScan disk into the built-in drive and turn on your Mac.
- ☐ Open ThunderScan by clicking on the ThunderScan disk icon and choosing **Open** from the **File** menu. Then click on the ThunderScan icon and choose **Open** again.

In a few seconds, the screen will look like this:

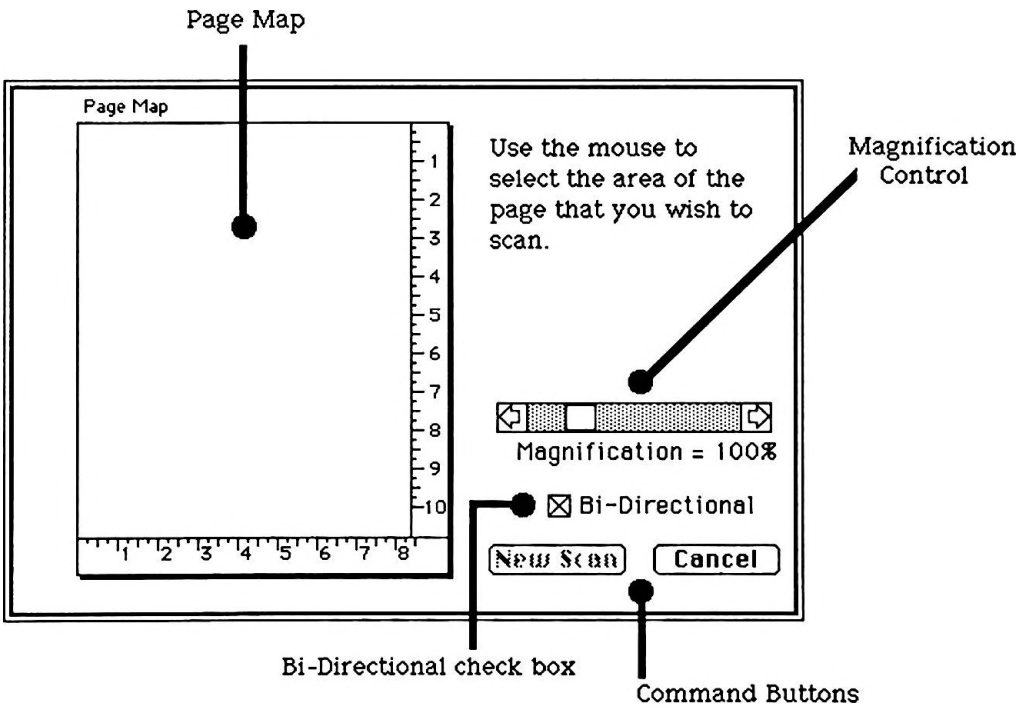


Scanning an Image

The image pane is empty right now because you haven't scanned anything yet. In this section, you'll watch it fill up with the image that you scan.

- ☐ Find the drawing of a train supplied with ThunderScan.
- ☐ Put it in the printer and check the scanner's focus. (The last section of *Installation* shows you how.)
- ☐ Make sure the printer is **on** and **selected**, that the special cover is on the printer, and that the switch on the adapter box is set to **scan**.
- ☐ Choose **Scan** from the **Scanner** menu.

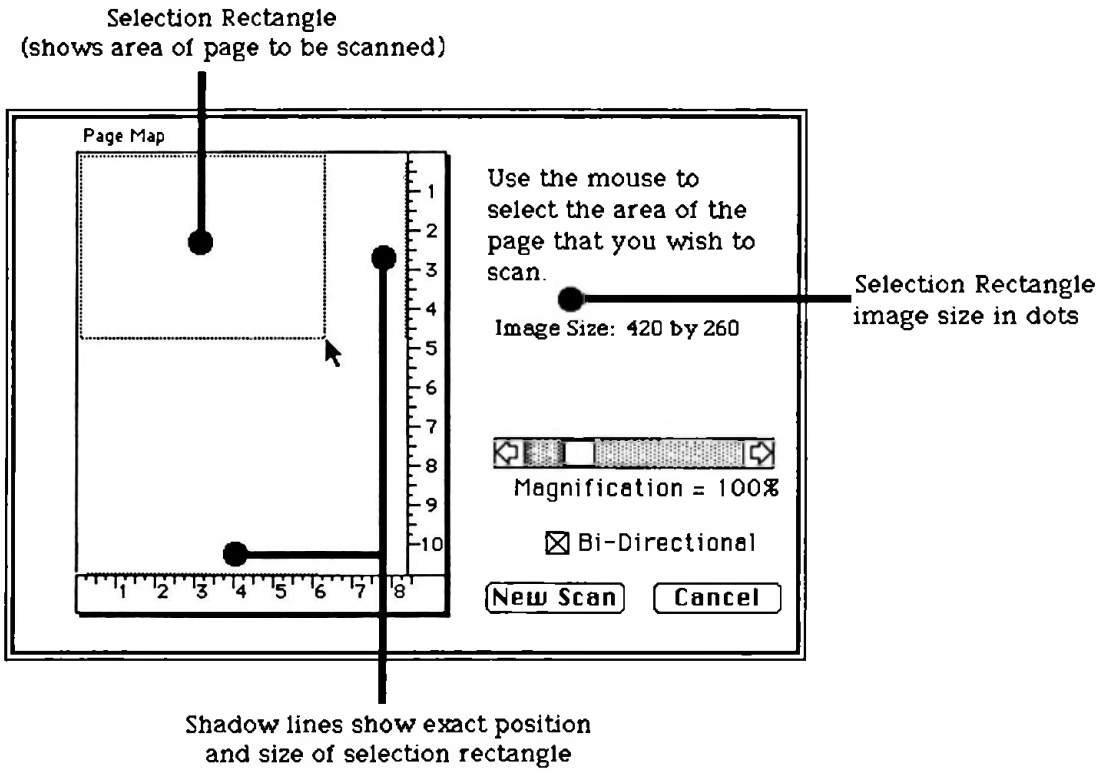
The **page map dialog box** appears:



The **page map** lets you select an area of your image to be scanned. To select an area to scan,

- Move the pointer on the page map to the upper left corner of the area you want to scan.
- Drag the mouse to the opposite corner of the area you want.

Notice that as the selection rectangle gets larger or smaller, a message tells you how large an image size you're selecting. This illustration shows about the size you should select for this tutorial:

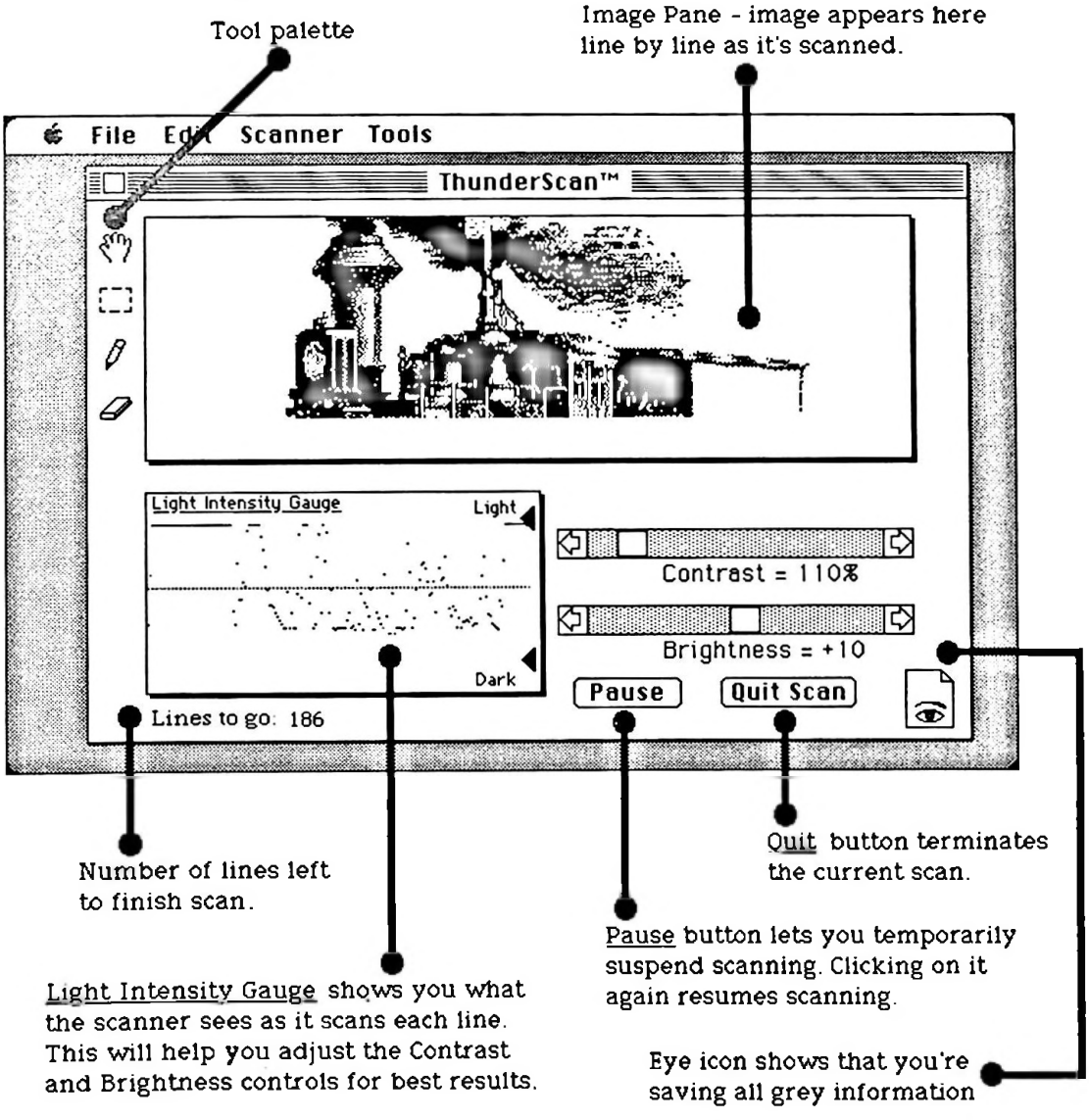

Selection Rectangle
(shows area of page to be scanned)
Page Map
Use the mouse to select the area of the page that you wish to scan.
Selection Rectangle image size in dots
Image Size: 420 by 260
Magnification = 100%
Bi-Directional
New Scan
Cancel
Shadow lines show exact position and size of selection rectangle

Note: If you see a message that says Too big to re-halftone or Too big to scan, don't worry. Just make your selection rectangle small enough so that the message disappears.

To start the scan,

☐ Click on the New Scan button.

You return to the main ThunderScan screen, and the image starts to appear, line by line, in the image pane. Here's what you should see:


Tool palette
Image Pane - image appears here line by line as it's scanned.
File Edit Scanner Tools
ThunderScan™
Light Intensity Gauge
Light
Dark
Contrast = 110%
Brightness = +10
Pause
Quit Scan
Lines to go: 186
Number of lines left to finish scan.
Light Intensity Gauge shows you what the scanner sees as it scans each line. This will help you adjust the Contrast and Brightness controls for best results.
Pause button lets you temporarily suspend scanning. Clicking on it again resumes scanning.
Quit button terminates the current scan.
Eye icon shows that you're saving all grey information

The image of the train might be too light or dark for your liking - don't worry, you'll be able to change it later using the brightness and contrast controls.

Sometimes you might want to start over because you're not getting the right part of the image or you realize you actually wanted to scan another image. To quit scanning before ThunderScan is finished, you can press the Quit Scan button. (But don't do this unless you really want to quit scanning the current image.)

Your Macintosh will beep to let you know when it's finished scanning.

Playing with ThunderScan

Now you can play with the image in memory, changing contrast and brightness, making halftones and high-contrast images.

Since a scanned image can be quite large, you only see a small part in the image pane. Here's one way to see more of the image:

- Click on in the tool palette.
- Move the pointer into the image pane. (It turns into the hand.)
- Hold down the mouse button and drag the image with the mouse.

Give the image a push and it keeps going, even after you let go of the mouse button. That's called **autoscrolling**. The faster you push, the faster the image scrolls in the direction you push.

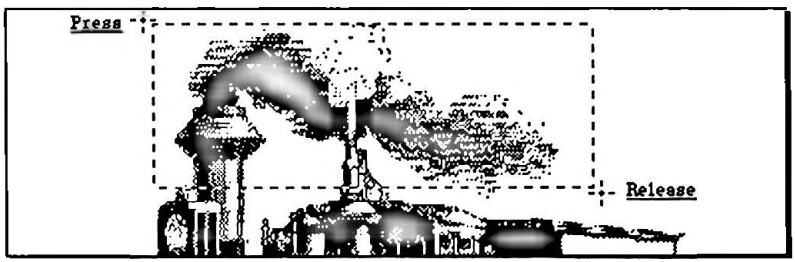
To stop the image from scrolling,

- Click the mouse button once.

Selecting an Area

When you want to change something in part of the image, you select an area with the selection rectangle.

- Click on [⬚]
- Drag the selection rectangle over an area in the image pane:



As you drag, a moving dashed line encloses your selection. Now you can choose commands from the **Edit** and **Scanner** menus to change the part of the image you've selected.

Changing the Contrast and Brightness

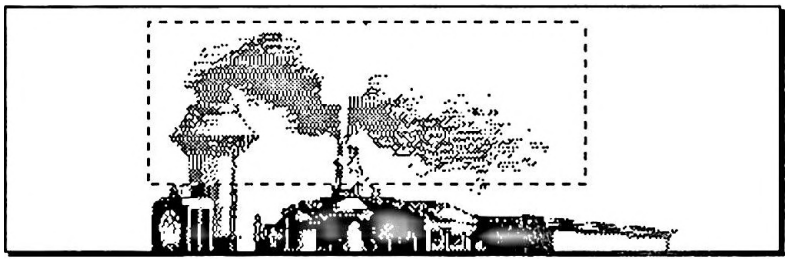
The contrast and brightness controls slide left and right. They work like the controls on a television set, but only affect the area you've selected.

To increase the brightness of your selected area:

- Slide the box in the brightness control bar a little to the right.

☐ Now Choose **Halftone** from the **Scanner** menu.

The selected area will be changed according to the new brightness control setting and the image should look lighter.



Go ahead and experiment with the brightness and contrast controls until you have your image the way you like it. Select different parts of the image and try different things. Try tools we haven't explained, to see what they do. Do what you want!

For variety, choose **High Contrast**, instead of **Halftone**. **High Contrast** gives you a stark black-and-white image, leaving out most of the gray. The contrast control lets you choose a contrast point between a halftone and a high-contrast image.

Saving

After you've finished playing with the image, you can save it for posterity as a **scan image**. Then you can come back whenever you want, to play with it some more.

☐ Select **Save as Scan Image. . .** from the **File** menu

☐ Type a name for the document.

☐ Click on the **Save** button.

Printing

Now you can print your work of art, so you can hang a copy on the wall.

- ☐ Turn off the Imagewriter. (Always turn off the printer when you change cartridges.)
- ☐ Take the train image out of the printer.
- ☐ Replace the scanner with a ribbon cartridge.
- ☐ Replace the plastic cover and turn the printer back on.
- ☐ Turn the **Scan/Print** switch on the adapter box to **Print**.
- ☐ Load some paper into the printer.
- ☐ Choose **Select All** from the **Edit** menu (you want to print all of the image).
- ☐ Choose **Print Normal** from the **File** menu.

After you have a printed copy, if you want to leave ThunderScan,

- ☐ Choose **Quit** from the **File** menu.

If you see a dialog box asking whether to save any changes,

- ☐ Click the **Go Ahead** button.

Where to Go Next

You're ready to begin scanning in earnest. The next chapter, ***Using ThunderScan***, as you scan away, explains all of ThunderScan's features in detail.

Chapter 3: Using Thunderscan

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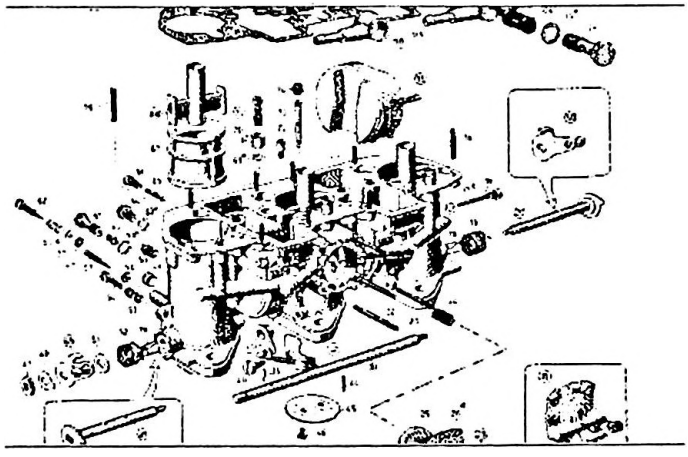


Using Thunderscan

Thunderscan lets you put images from paper into Macintosh. Once you have an image in Macintosh, you can use the Thunderscan tools to make the image look the way you want.

Scanning is the process that puts an image into the Macintosh. The **scanner** moves back and forth across the page, translating each point it sees into a dot corresponding to one out of 32 shades of gray. The whole computerized image consists of thousands of gray dots. That's called the **gray map**--because it shows where each dot is and what it's corresponding shade of gray is.

Because the Macintosh screen can only show black or white dots, Thunderscan figures out which dots to include to represent the image faithfully. It still remembers the gray map, so that you can work with the image until it looks exactly the way you want it to.

This chapter explains how to use Thunderscan. Make sure you have the scanner installed before you go any further. ***Installation*** has the details. If you'd like to start with a little guided practice, the Chapter ***Learning Thunderscan*** provides some lessons.

Fast Track

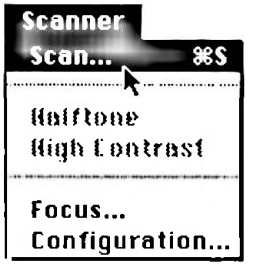
- Put original image in printer.
- Choose **Scan** from the **Scanner** menu.
- Select the area to scan.
- Set magnification.
- Click on the **New Scan** button.
- Work with the image to improve contrast, adjust brightness, move and change parts of the image.
- Print the image.
- Save as a Thunderscan image or MacPaint document.
- Cut or copy onto Clipboard or into your Scrapbook.

Scanning an Image

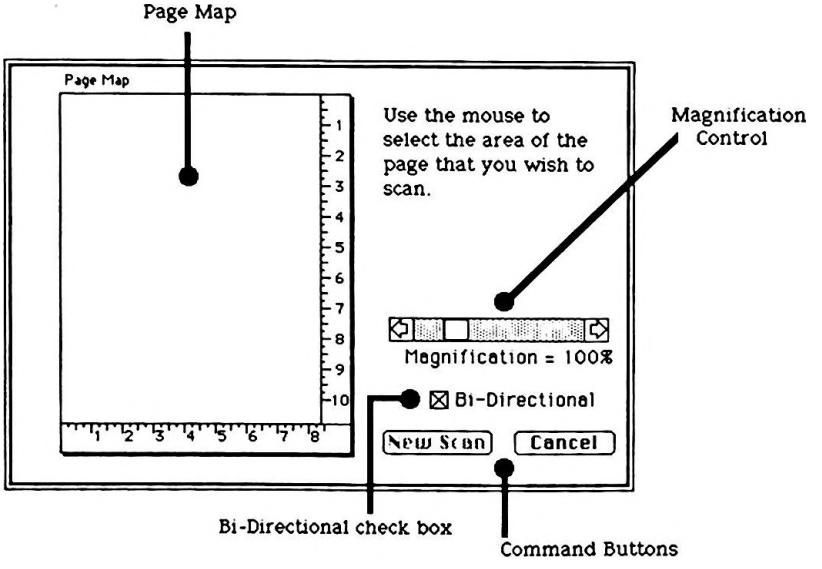
This section shows you how to take an image on paper and make it into a document Macintosh can use.

Choosing to Scan

- Pull down the **Scanner** menu and choose **Scan**.



After you choose **Scan**, you'll see the **page map dialog box**.



Setting Magnification

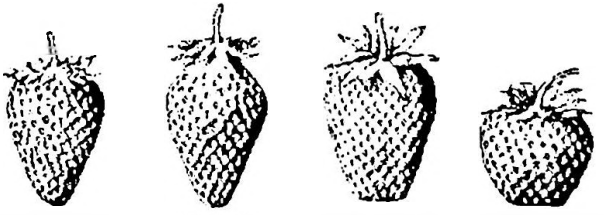
You can enlarge or reduce the image you're scanning. You can enlarge up to 400% (16 times by area), depending on the memory available in the computer to store the image. The quality of an enlargement depends on the quality of the original. With a high-quality original (like a magazine photo), an enlarged image should have the same image quality as a same size reproduction. You can also reduce an image to 25% (1/16 by area) of original size.

- ☐ Move the pointer onto the slider box on the magnification control.
- ☐ Slide the box to the left to decrease magnification, or to the right to increase magnification.

If you click on an arrow on the magnification control, you'll adjust the magnification by 2%. Clicking on the gray area adjusts magnification by 20%).

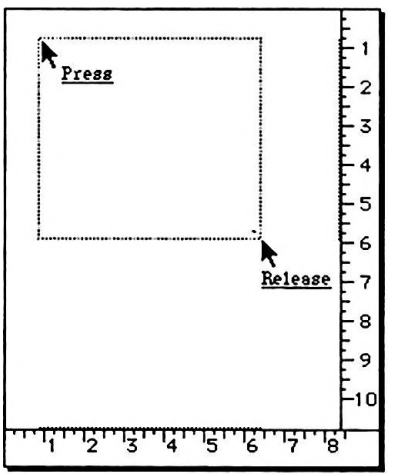
Thunderscan shows you the amount of magnification below the control bar.

Note: As you increase the magnification, you may also get a message saying Too big to scan! or Too big to re-halftone! These messages are explained in the next section.



Selecting an Area to Scan

- Move the pointer into the page map.
- Put the pointer at the upper left corner of the area you want to scan.
- Press the mouse button and drag the pointer over the area you want to scan. The selection rectangle expands as you drag the pointer.
- When the selection rectangle covers the area you want to scan, release the mouse button.



Note: If you try to scan a large area, you may see a message saying

Too big to scan!

The message goes away if you select a small enough area. Another message may appear while you're selecting an area:

Too big to rehalftone!

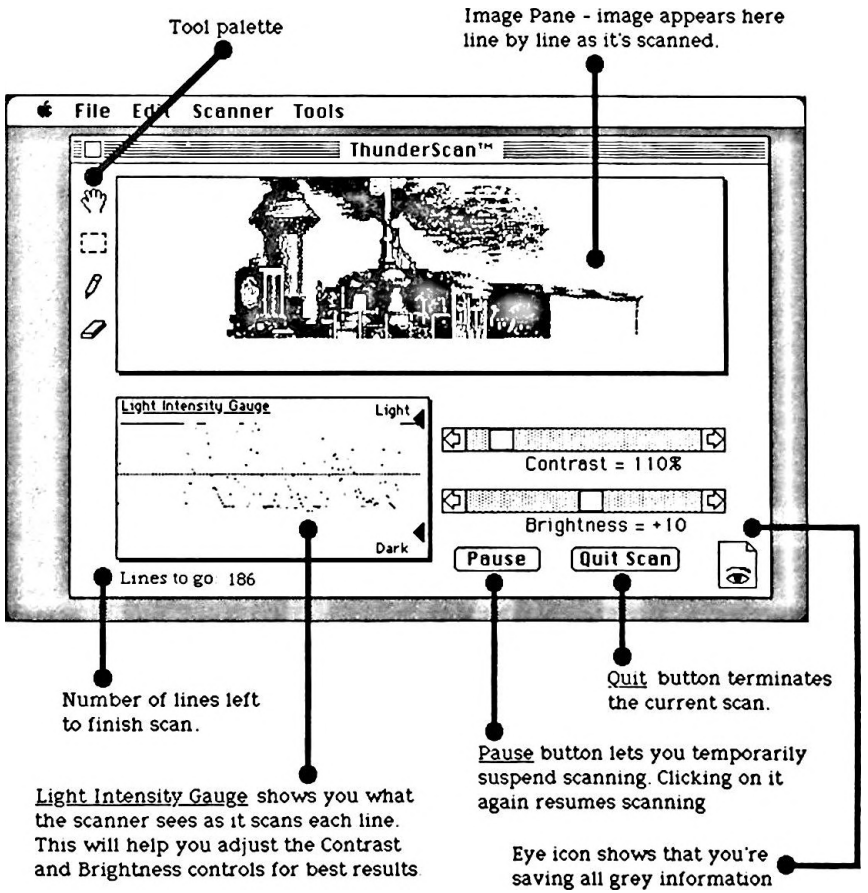
That just means that you don't have enough memory or disk space to save all the information about gray shades in the image. You'll be able to scan the image, but you won't be able to change the contrast or brightness after the original scan. You may want to scan anyway, when changing the original contrast or brightness isn't important. You can also make room on the disk for a larger image. Your Macintosh owner's guide tells you how.

Choosing New Scan

To start a scan:

☐ Click on the New Scan button at the bottom of the scan screen.

You return to the main ThunderScan screen. As the scanner starts scanning, the image pane begins to fill with your image. You can learn more about the main ThunderScan screen in the next section, ***Working with a Scanned Document.***

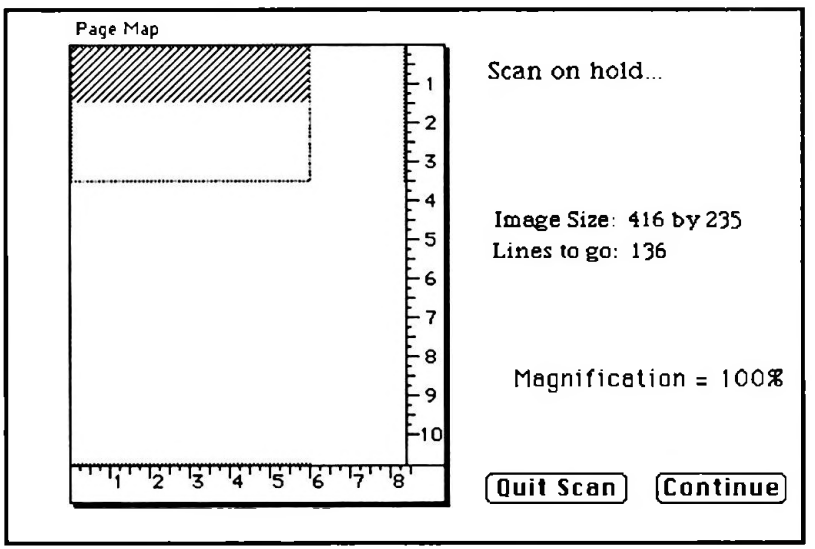

Tool palette
Image Pane - image appears here line by line as it's scanned.
File Edit Scanner Tools
ThunderScan™
Light Intensity Gauge
Light
Dark
Contrast = 110%
Brightness = +10
Pause
Quit Scan
Lines to go: 186
Number of lines left to finish scan.
Light Intensity Gauge shows you what the scanner sees as it scans each line. This will help you adjust the Contrast and Brightness controls for best results.
Pause button lets you temporarily suspend scanning. Clicking on it again resumes scanning
Quit button terminates the current scan.
Eye icon shows that you're saving all grey information

Checking the Progress of a Scan

ThunderScan can show you on the page map how much of an image has been scanned. To check the progress of a scan,

☐ Select **Scan** from the **Scanner** menu.

The page map appears with shading to indicate what's already been scanned. The **lines to go** indicator shows you how many lines remain to be scanned.



To return to the main ThunderScan screen,

☐ Click on Continue

Extending the Scan

If you'd like to scan just a little bit more of a document, but don't want to go through the entire scanning process again, you can extend the original scan beyond the point where it stopped. After the scan is complete, the **Pause** button becomes the **Extend** button. To extend a scan:

☐ Click on Extend

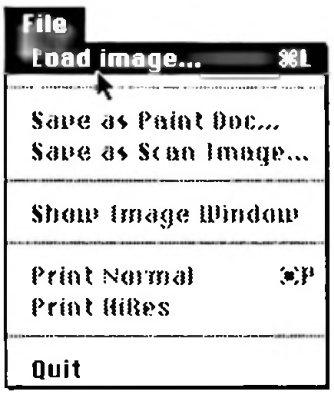
Working with a Scanned Document

Loading an Image

Unless you've just scanned an image, you have to load an image from the disk in order to have something to work with.

From ThunderScan:
To load an image after you've started the ThunderScan Application:

- ☐ Choose **Load Image...** from the **File** menu.



- ☐ Choose an image document from the list on the **Open** window. (It shows you both Scan Image documents and MacPaint documents on the current disk volume).

- ☐ Click on **Open**.

Voila! The image appears in the image pane. The icon in the lower right shows you if the image has a gray map or not. **Note** that if you've loaded a MacPaint document and the Trim White option is turned on, ThunderScan compresses the white areas of the image. See the ***Reference - Advanced Features*** section for details.

From the Finder:
You can open ThunderScan by opening a Scan Image document.

- ☐ Click on the icon for the document you want.

- ☐ Choose **Open** from the **File** menu.

The image appears in the image pane on the main ThunderScan screen.

Looking at More of the Image

Since an image in memory can be up to 32 by 40 inches in size (if you scanned an 8" x 10" area at 400% Magnification), you can't see the whole thing in the small image pane. So ThunderScan lets you move the image around within the image pane.

- ☐ Click on
- ☐ Put the hand in the image pane and drag the image around.
- ☐ Release the mouse button when you see the part of the image you want.

You can also **scroll** the image--right or left, up or down--by nudging the hand.

- ☐ Move the hand onto the image area.
- ☐ Press the mouse button, push the hand a little, and while it's still moving release the mouse button.
- ☐ To stop the image from scrolling, click the mouse.

A hard nudge makes the image scroll quickly. A soft nudge makes the image scroll slowly.

Selecting an Area to Work With

Before you can work with an image, you have to select an area to work with.

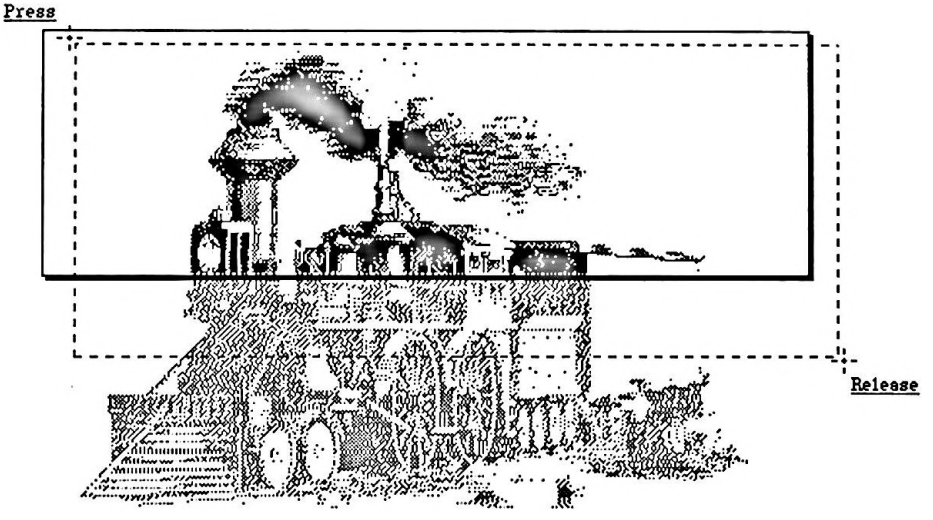
You don't have to make everything look the same in your image. For example, you might want to make part of it lighter than another part. You can do this by selecting different parts of the image and working with them separately from the other parts.

- ☐ Choose from the tools palette. It's on the left side of the image area. (You can also choose any tool from the **Tools** menu.)
- ☐ Drag the selection rectangle across the area you want to select.

You can turn the selection rectangle into the temporarily by pressing the Option key.

For images larger than the Image Pane area:

- Drag the selection rectangle from one corner of the area you want to the edge of the image pane. The image starts to scroll.
- Release the mouse button when you've selected the entire area you want to work with.



You can also select a large area by clicking on the top corner of the area you want, scrolling to the opposite corner, and shift-clicking.

To select the entire image:

- Double-click on the selection rectangle [⬚], or
- Choose **Select All** from the **Edit** menu.

Using the Pencil

The pencil lets you draw lines.

- ☐ Click on
- ☐ Start the pencil on a white dot to draw black.
- ☐ Start the pencil on a black dot to draw white.
- ☐ Hold down the mouse button and move the pencil around to draw.

You can draw in a perfectly straight line by putting the pencil at the edge of the image area, holding the mouse button down, and moving the pencil off the edge of the image area. The image starts to scroll while the pencil draws the line.

You can turn the pencil into the temporarily by pressing Option

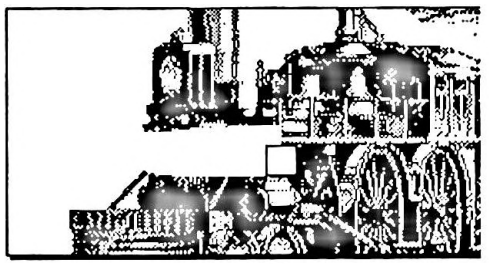
Erasing

Thunderscan lets you erase in black or white.

- ☐ Click on
- ☐ Hold the mouse button down and move the eraser over anything you want to erase.

With a photograph, you may want to erase with black - ThunderScan lets you.

- ☐ Hold down ⌘ and press the mouse button.



Erasing to White

Erasing to Black

You can erase in a perfectly straight line by putting the eraser at the edge of the image area, holding the mouse button down, and moving the eraser off the edge of the image area. The image starts to scroll while the eraser erases in a straight line.

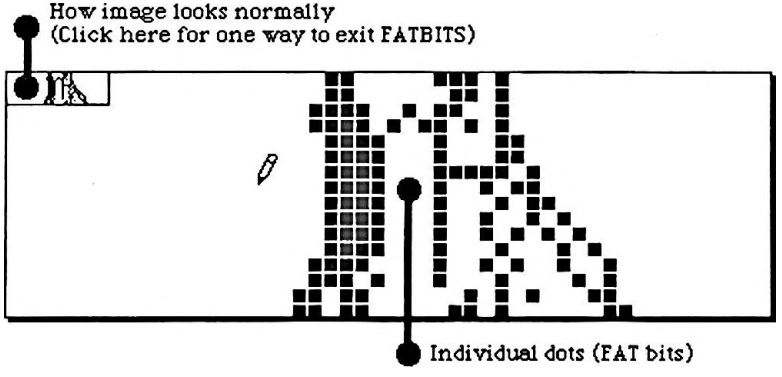
You can turn the eraser temporarily into the hand by pressing Option .

Working in Detail

You can work with the individual dots that make up an image by using a tool called **Fatbits**. It works the same way as in MacPaint.

To enter Fatbits:

- Choose **Fatbits** from the **Edit** menu, or
- Double-click on , or
- To enter Fatbits exactly where you have the pencil, ⌘ -click.



Most of the tools work in Fatbits, just as they do in the regular image window. The only exception is the selection rectangle.

- Use the hand to move around in Fatbits.

> **Note: If you don't see any big dots in Fatbits, you're probably just on a white part of the image. Try scrolling the image until you find a darker part.**

- Use the pencil to draw individual dots (white or black) in Fatbits.
- Use the eraser to erase groups of dots (or draw groups of black dots).

Fatbits gives you the same auto-scrolling feature you can use with the tools in the regular image area. That means you can start a straight line or an erasure at the exact dot you want.

To Leave Fatbits:

When you decide to leave Fatbits, you can choose one of three ways:

- Click on the upper left corner of the image pane, or
- Choose **Fatbits** from the **Edit** menu, or
- Choose [⬚] . (You can't select in Fatbits, so this returns you to the full-sized image.

Cutting

You can cut part of an image out and move it or copy it somewhere else. Cutting leaves a white hole in the image where you cut.

- Select the part of the image you want to cut.
- Choose **Cut** from the **Edit** menu.

The cut part of the image goes onto the clipboard. You can paste it into another place on the image or into another document.

Copying

You can copy part of an image to the clipboard and then paste it somewhere else within the image.

- Select the part you want to copy.
- Choose **Copy** from the **Edit** menu.
- Select the area you want to copy to.
- Choose **Paste** from the **Edit** menu.

You can paste the same copy as many times as you want. And you can enlarge, shrink, and squeeze or stretch each image differently. Just change the shape of the rectangle of the image you're copying.

Pasting

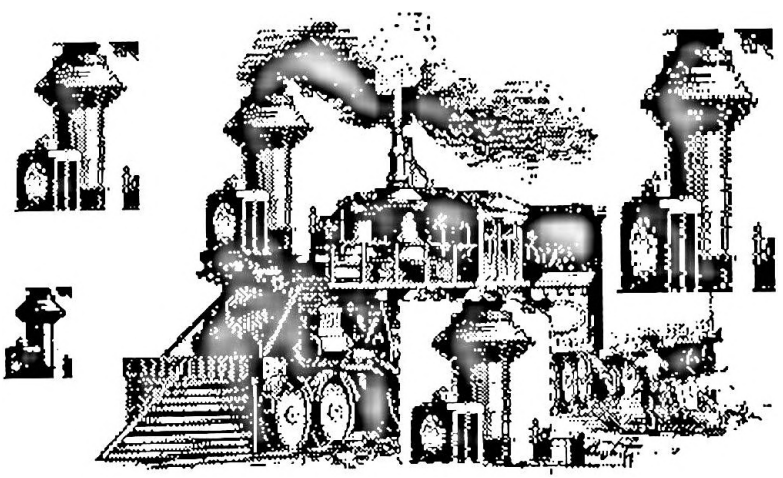
You can paste parts of an image that you've cut out or copied.

- Select the location you want to paste something into.
- Choose **Paste** from the **Edit** menu.

By changing the size of the selection rectangle where you want to paste, you can vary the size of the image you're pasting. That means you can enlarge, shrink, squeeze, or stretch images.

You can paste the same selection into as many different areas as you want. To change the shape of the pasted image, change the shape of the selection rectangle where you want to paste the image.

You can paste a selection into the same-sized area. Just click the selection cursor where you want the upper-left corner of your pasted image to be and choose **Paste**.



Clearing

To make a large area white quickly,

- ☐ Select the area you want to clear.
- ☐ Choose **Clear** from the **Edit** menu.

Making Negatives (Inverting)

An interesting way to highlight material is to **invert** it: to change black dots to white and vice versa.

- ☐ Select the area you want to invert.
- ☐ Choose **Invert** from the **Edit** menu.

Selected area before INVERT

Selected area after INVERT

Looking at the Big Picture

Sometimes you'll want to see more of your image than the little image pane area shows.

- ☐ Select **Show Image Window** from the **File** menu.
- ☐ Adjust the size of the image window (larger or smaller) by dragging from the lower-right corner.

You can move the image window around by dragging it from its title bar, and you can put it temporarily behind the ThunderScan window by clicking on the ThunderScan Window title bar.

When you have the big image window on the screen, you can't see the tools palette anymore.

- ☐ Choose tools from the **Tools** menu.

You can use all the tools when you have the image window on the screen. Unfortunately, you can't use **Fatbits**.

You can hide the image window in two ways:

- ☐ Click on **Hide Image Window** in the **File** menu, or
- ☐ Click on the close box in the upper right corner of the image window.

Halftones

A **halftone** shows a smooth transition from white to black in an image. If you scan an image with the controls at their standard positions, you get a halftone image.

As you scan an image, it appears in the image pane as a halftone. If you don't like the image you see just after scanning, you can change all or part of it by rehalftoning. This only works if ThunderScan was able to save the information about gray-shades in the image. ThunderScan tells you when it has gray-shade information by displaying this icon at the lower-right of the main ThunderScan Window:

You can increase the **brightness** if the image appears too dark, or lower the brightness if it's too light.

You can change the **contrast** if there's not enough difference between light or dark, or if there's too much difference.

- ☐ Set the Brightness Control by sliding the box back and forth.
- ☐ Set the Contrast Control in the same way.
- ☐ Select the area you want to change (or **Select All** from the **File** menu).
- ☐ Choose **Halftone** from the **Scanner** menu.

The area of the image you selected will be changed according to the new Contrast and Brightness settings. As the area is rehalftoned, the Light Intensity Gauge displays the amount of the light and dark information in the image area. Set the Contrast and Brightness Controls so that the dots in the Light Intensity Gauge are as widely distributed as possible. Try to avoid having a line of dots at either the top or the bottom of gauge.

Choosing High-Contrast

High-contrast pictures are stark, with lots of white and black but very little gray. If you have an image with text on it, you might want to select the text areas and put them in high contrast to make the letters more readable. This only works if ThunderScan was able to save the information about gray-shades in the image.

- ☐ Set the brightness and contrast levels. (You don't have to change the contrast setting at all to get a high-contrast image.)
- ☐ Select the area you want in high contrast.
- ☐ Choose **High Contrast** from the **Scanner** menu.

The area of the image you selected will be changed to high-contrast.

If you want high-contrast all the time, see the section on **Permanent High Contrast** in ***Reference - Advanced Features***.

Rescanning

Suppose after changing the contrast and brightness, trying a number of combinations, you still don't have an image you like. Maybe it's too small and you decide you want an enlargement. Or you want to reposition the image in the printer. You can always re-scan the original image.

- ☐ Choose **Scan** from the **Scanner** menu.
- ☐ Click [Restart]
- ☐ Set the new magnification and select a new area to scan, if necessary.
- ☐ Click [New Scan]

If you haven't saved the first scan image,

- ☐ Click on **Go ahead** if you don't mind losing it, or
- ☐ Click on **Cancel** if you want to go back and save it before rescanning.

Saving

As a Scan Image

You can save the entire ThunderScan image you've created, along with any gray-shade information that was gathered. Saving the scanned image allows you to return later to make more halftoning and contrast decisions. To save a scanned image as a Scan document:

- ☐ Choose **Save as Scan Image. . .** from the **File** menu.
- ☐ Type a name for the document.
- ☐ Click on **Save** or press Return

After ThunderScan saves the image, you return to the main ThunderScan screen where you can work with the image some more, or you can quit.

As a MacPaint Document

After you've finally got an image you really like, you can save that image as a MacPaint document. Then you can work with it further in MacPaint or transfer it into a MacWrite document. Once you've saved an image as a MacPaint document, you've lost its gray map information and can't change its contrast or brightness.

To save a scanned image as a MacPaint document,

- ☐ Select the upper left corner of the area you want to save.
- ☐ Choose **Save as Paint doc. . .** from the **File** menu.
- ☐ Type a name for the document.
- ☐ Click on **Save** or press Return

ThunderScan saves 8 by 10 inches (576 by 720 dots) of your image, starting at the upper left corner of the area you've selected. You return to the main ThunderScan screen, where you can work with the image some more, or quit.

On Another Disk

If your disk is too full, you can save both scanned images and MacPaint documents on another disk. Use the standard method of switching to another disk, as described in your Macintosh owner's guide.

Printing

ThunderScan allows you to print two ways:

- **Normal Printing**. This option gives you a normal-sized image.
- **High-resolution printing**. This option packs twice as many dots per inch as normal printing. The result is an image half the size of a normal image but with twice the resolution. To get a full-size image with hi-resolution printing, scan your original image at 200%. Then set the Brightness Control at the high end of the scale (as high as 80 or 90) and rehalftone. Lighter images give the best clarity.

To print an image with ThunderScan:

☐ Choose **Print Normal** or **Print HiRes** from the **File** menu.

☐ Make sure that you've replaced the scanner with the printer ribbon cartridge.

☐ Flip the switch on the ThunderScan adapter box from **Scan** to **Print**.

☐ Click **OK** in the dialog box.

To stop printing before completion, press ⌘.

Quitting

When you're finished using ThunderScan,

- Choose **Quit** from the **File** menu, or
- Click on the close box on the main ThunderScan screen.

- If a dialog box appears, you can choose to throw out changes you may have made, or cancel your choice to quit.

Disconnecting the Scanner

You should switch the scanner off whenever you're not scanning--even when you're working with the image you just scanned. That protects the scanner from signals intended for the printer.

- Flip the switch on the adapter box from **Scan** to **Print**.
- If you want to print soon, turn off the printer and remove the scanner from the printer, before inserting a ribbon cartridge.
- Put the scanner in a safe place.

Chapter 4: Reference

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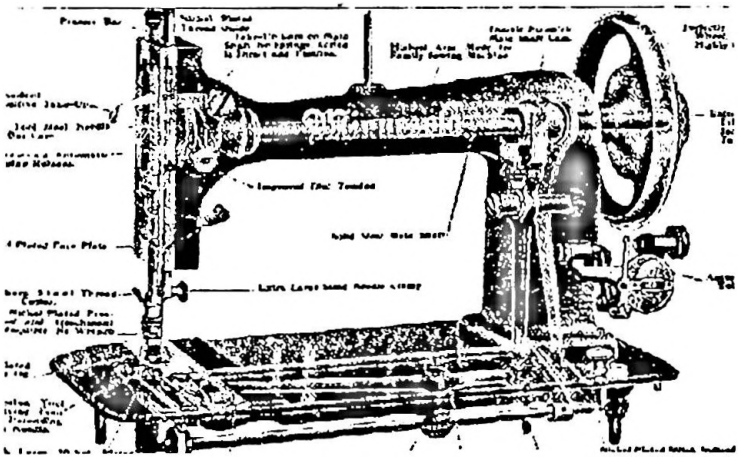
57 Taking Care of the Scanner

57 Scan Document Format

58 Shortcuts

60 If You Have Problems...



Advanced Features

ThunderScan has some advanced features that will help you get the absolute best quality from your scanned images and become an Image Wizard:

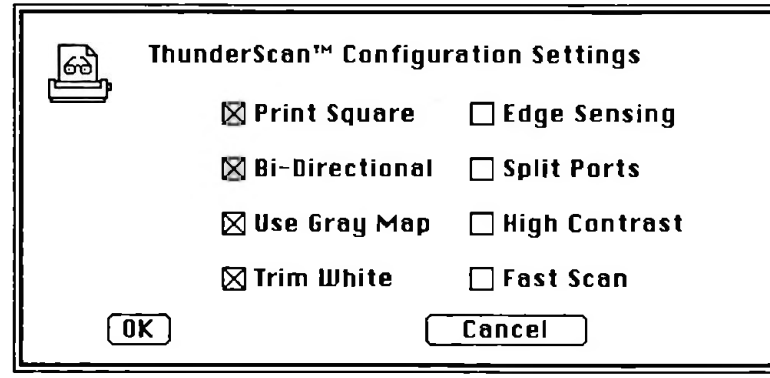
- Printing square
- Bidirectional scanning
- Using the gray map
- Trimming white space
- Edge sensing
- Using split ports
- High contrast
- Fast scanning
- Fine-tuning with the Light-Intensity Gauge

Configuration Settings

You can set several advanced features using the **configuration dialog box**. They all work the same way: just put a check mark in the appropriate box to turn an option on, and remove the mark to turn it off. Here's how:

☐ Choose **Configuration** from the **Scanner** menu.

You'll see the configuration dialog box.



☐ Click the check box to switch the setting for the option you want.

☐ Click **Okay**.

The rest of this section explains how each option works.

Using the Print Square Option

When you choose Print Square on the configuration window, your images will print out undistorted. Without this option set, images come out slightly squeezed, because there's less horizontal resolution. They'll print faster, though, and the resolution with Print Square off can be better on text. ThunderScan comes with Print Square turned on.

Bidirectional Scanning

To speed up the scanning process, ThunderScan comes set to scan **bidirectionally**--in both directions. For super-high-quality resolution, you can turn bidirectional scanning off. For most purposes, the extra speed and somewhat lower quality of bidirectional scanning is adequate.

Using the Gray Map

ThunderScan comes set to save gray-shade information when you scan (if the area of your image is small enough). The gray map records one of 32 different shades of gray for each dot in an image. That's what allows you to change the contrast and brightness settings.

You can choose not to use the gray map during scanning. You'll be able to scan larger images, but not to rehalftone them, even if you save them as scan images.

Trimming Extra White Space

This option applies to MacPaint documents only. ThunderScan comes set to trim extra white horizontal lines in an image. When Trim White is set, if there are two or more white horizontal lines in a row, Thunderscan saves only one and eliminates the rest. You'll find this useful in at least two situations:

- When you're short on memory, MacPaint documents will take up less space.
- Since MacPaint documents take up 8 by 10 inches, even with small images, Trim White removes the ocean of white space surrounding a small image.

Edge Sensing

Edge sensing increases the accuracy of the scanning process by aligning the scanner optically rather than mechanically. ThunderScan comes with edge sensing turned off. (But edge sensing is automatic when Thunderscan is set to scan bidirectionally.) In order to use edge sensing, you should have a strip of white timing tape installed on your printer platen. See the section on ***Installation***.

Using the Split Ports Option

The split ports option lets you connect the printer and the scanner to separate sockets in the back of your Macintosh. To use split ports, connect the printer to the printer socket on the back of your Macintosh. Then connect the scanner and the adapter box to the communications (modem) socket.

Setting Permanent High Contrast

If you really like high-contrast images (for example, if you scan a lot of text), you can have Thunderscan always scan in high contrast.

Choosing Fast Scan

You can make the scanner go faster by choosing the fast scan option. Fast Scan lets Thunderscan concentrate on scanning. To do so, you lose some of the instant feedback you normally get during scanning: you won't see what's being scanned appear as quickly in the image pane, and you won't see the lines left to go indicator. There's no loss in quality

Fine-tuning with the Light-Intensity Gauge

The light intensity gauge on the main ThunderScan screen has a line through its middle and two black arrowheads along its right edge. When you scan, little dots appear here and there in the gauge.

Higher dots represent lighter parts of the image. Lower dots represent the darker parts.

The arrowheads located on the right-hand side of the Light Intensity Gauge are called **indicators**. They help Thunderscan decide what the center of the contrast range is. Fine-tuning is most effective for low-contrast documents, where there's little difference between the lightest and darkest parts of the document. When there's a very light or dark area in such a document, it can throw off the setting for the center of the range. That means Thunderscan won't differentiate much among the finer shades of gray. By moving the indicators up or down, you can fine-tune Thunderscan's ability to tell the difference among those shades.

You can fine tune whenever you want--before, during, and after scanning, or while half-toning or high-contrasting.

Your goal in fine-tuning is to cut off unusual light or dark peaks within the light intensity gauge. The Contrast Control must be set higher or lower than 100% for fine-tuning to be effective.

- ☐ Drag the top indicator down to tell Thunderscan to ignore dots at the top.
- ☐ Drag the bottom indicator up to tell Thunderscan to ignore dots at the bottom.

If you fine-tune during scanning, you'll see the results immediately.

ThunderScan Tips

Most of the time, you'll be able to use ThunderScan without much trouble. But if you do have a problem, take a look at these tips to see if they offer a solution.

Selecting an Area

If you try to work with an image and none of the options you want are available, make sure that you've selected an area to work with. You have to select an area to work with before many options become available. The **Halftone** and **High Contrast** items in the **Scanner** menu only work if you've selected an area and your image has gray-shade information with it.

Scanning Unusual Items

ThunderScan works with just about anything that will roll through your Imagewriter. But some types of images may not come out the way you expect them to:

- Colors in the original will appear as shades of gray. Warm colors like reds, oranges, and yellows will be lighter shades. Cool colors like greens, blues, and purples will be darker shades.
- Some water-based inks don't reproduce clearly. You don't need to worry about this with most pens.
- 3-D objects need to be transferred to paper in order to be scanned. A photograph or a photocopy enables you to scan just about anything you can see.
- Folds and wrinkles in the original may show up as dark lines.
- Some materials may be too thick or too small to roll through your Imagewriter reliably. If you have trouble feeding something around the platen, or if the roller shaft won't snap it firmly against the platen, that's a good indication that it's too thick to scan.

A simple photocopy of most of these items will make them easier to scan. In fact, scanning a photocopy of a picture or other image often produces some interesting and creative effects--you may find a photocopier an excellent, general-purpose tool in scanning.

If you don't have access to a copier, you can use the plastic carrier supplied with ThunderScan to make it easier to scan unusual items.

Using the Plastic Carrier

Sometimes you'll want to scan an image that starts at the very top or very bottom of a page, where the Imagewriter can't feed it properly. Or you'll want to scan an image on a small piece of paper, or a piece of paper that has folds or wrinkles. If you can't make the image easier to scan by using a copier, you can try scanning these using the plastic **carrier** that comes with ThunderScan. It's the plastic sheet that's shiny on one side and dull on the other. The dull side is called the **matte** side.

To use your carrier, just attach your image face down to the shiny side of the carrier, using a small piece of transparent tape to hold the item in place. Attach the item with only one piece of tape at the top or bottom. Then roll the carrier into the printer. Make sure the dull side of the carrier is facing out, away from the platen.

File Size Limitations

File size limitations depend on what kind of Macintosh you're using and with what kind of disk drive. Essentially, a file can be as large as will fit on the disk. If the disk is filled up, a file will have to be small.

Making the Best Use of Your Equipment

ThunderScan comes on a disk ready to use, but you may want to move files around a bit to customize it for the equipment you have. Scan images tend to take up a lot of space, so you'll want to make as much room for them on disk as you can. When ThunderScan starts to scan an image, it looks for a place to accumulate the image's grey-shade information. If there's not enough room in memory, ThunderScan will try to put it on the disk that contains the ThunderScan application. These suggestions will give you more room on disks to store images.

128K with one drive: Keep only the ThunderScan application and system folder on the disk with your files. That leaves over 220K for your files.

128K with two drives: Put the system folder on a disk in the internal drive and only the ThunderScan application on a disk in the external drive.

512K with one or two drives: These same suggestions apply for Macintoshes with larger memories. Because there's more memory, though, ThunderScan can keep the gray map in memory until you save it as an image file, speeding up the scanning process.

If you're not sure how to move folders and copy files with Macintosh, see your owner's manual for details.

Undoing Mistakes

When you see this icon in the lower-right corner of the main ThunderScan window, you have a gray map available to work with. When you have a gray map, you can undo any mistake by **rehalftoning**. Select the area you want to fix (or select the whole image), set the Brightness and the Contrast at their original settings, and then choose **Halftone** from the **Scanner** menu.

Using Huge Images

To print an image larger than one page, print one part at a time. Select the part you want to print first, print it, and then move on the next parts. You can also use the **Print HiRes** to to shrink the image when you print it.

You can scan an original image that's larger than the 8 by 11 inch capacity of the Imagewriter by cutting it into page-sized chunks and scanning them as separate images. Then you could then paste them together once they're in your Macintosh.

If you don't care about saving a gray map (and therefore changing contrast or brightness), you can make much larger images than normal by ignoring the "too large to reprocess" message.

Working with MacPaint Documents

Although ThunderScan has fewer tools that MacPaint, there are several reasons why you might want to work with a MacPaint document using ThunderScan:

1. You can work with a much larger image in ThunderScan.
2. Because the image is in memory, you can scroll and move objects more quickly and easily.
3. You can copy a full-width image onto the clipboard, rather than just what fits on the screen at one time.
4. You can select part of an image to print, if you don't want to print the whole thing. You can also print high-resolution images.

Once you save an image as a MacPaint document, you can move it into a MacWrite document. (See your MacWrite manual for details.) Please note that you won't be able to change the image in MacWrite--even if it's text. That's because ThunderScan only sees collections of dots in various shades of gray. It can't read text. It's not an optical character recognition system.

Taking Care of the Scanner

Be kind to your scanner. Treat it as you would any piece of precision optical equipment. It's pretty sturdy, but it's not unbreakable. It will hold up well under normal use. Avoid dropping it, of course, and try not to bump it into hard objects. Don't put things on top of the scanner. Do put your scanner in a safe place when it's not in use.

It's virtually maintenance-free, too. If you notice dust gathering inside the opening in the nose of the scanner, take a cotton swab and gently brush out the dust.

Scan Document Format

If you're interested in developing a new use for scan image files, this section explains the format for scan image documents.

SCAN documents are of type SCAN ($5343414E). You can store images with many bits per pixel as scan documents, and you can also store single-bit deep images that are too big to be stored as MacPaint documents (that is, larger than 576 X 720 bits).

The format consists of three parts: a 512-byte header, an optional gray map, and an optional single-bit deep bitmap that is the halftoned gray image (in other words, the image that you can see on the screen).

Here's the header's format:

Offset 0:	16-bit version number (currently 0)
Offset 2:	bounding rectangle (8 bytes)
Offset 10:	number of bits per pixel (currently 1 or 5), (16 bits)
Offset 12:	resolution
Offset 14:	boolean specifying scanned speed
Offset 15:	byte specifying packing format (currently 0)
Offset 16:	size of one-bit deep port (long word)
Offset 20:	file offset to start of one bit port (long word)
Offset 24:	contrast value (word)
Offset 28:	brightness value (word)

The gray map consists of scan lines packed with 4 bits per pixel, 2 per byte, followed by remainder bytes (the fifth bit), 8 per pixel.

The one-bit deep bitmap is straightforward--it's not packed at all. Its length and start are specified in the header.

Shortcuts

Double-click on:

to start ThunderScan.

to start ThunderScan with a Scan image.

to select an entire image.

to get to Fatbits.

Shift-click:

To **select a larger area than you started with**,

- Move the pointer to the new corner of the selection rectangle.
- Press Shift and click.

To **paste without selecting** an exact destination rectangle,

- Click the pointer on the upper-left corner of the destination.
- Select **Paste** from the **Edit** menu.

Command-click:

- To enter Fatbits exactly where you've placed .

Scrolling with a tool:

You can turn any tool into the hand temporarily.

- Hold down Option while you use the tool.
- Release Option to turn the hand back into the tool.

This is useful when you want to scroll quickly without having to switch tools.

Moving to MacPaint:

If you have MacPaint on the same disk as ThunderScan, you can move into MacPaint directly from the **Tools** menu.

- Choose **MacPaint** from the **Tools** menu.

You can't go into ThunderScan directly from MacPaint, however.

Keyboard Equivalents:

⌘ -L for **Load Image**	⌘ -C for **Copy**
⌘ -P for **Print normal**	⌘ -V for **Paste**
⌘ -S for **Scan**	⌘ -F for **Fatbits**
⌘ -X for **Cut**	⌘ -A for **Select All**

If You Have Problems...

If you're having trouble with your scanner, this section should help you. Go to the section below that best describes the trouble your having and see if the suggestions given solve the problem.

Poor Image Quality

Too Dark: If you scan an image, but it always comes out too dark, even after you've tried rescanning with different contrast and brightness, be sure you've adjusted the focus properly and that your original isn't wrinkled or too thick to feed easily through the printer. The original must lay flat against the platen.

Too Light: If your image always appears too light or washed-out, try adjusting the focus to get a slightly lower number in the Focus box than the highest value. If the document has a very glossy or shiny surface, you should make a photo-copy and try it.

Jagged or Uneven Lines: If the image has jagged or uneven lines where they should be straight, it may be a bidirectional scanning problem. Make sure you've installed the white timing tape on the left edge of the platen, and that the tape is clean and that the overlapping edge is stuck down. Try scanning the image with the bidirectional and edge-sensing options off.

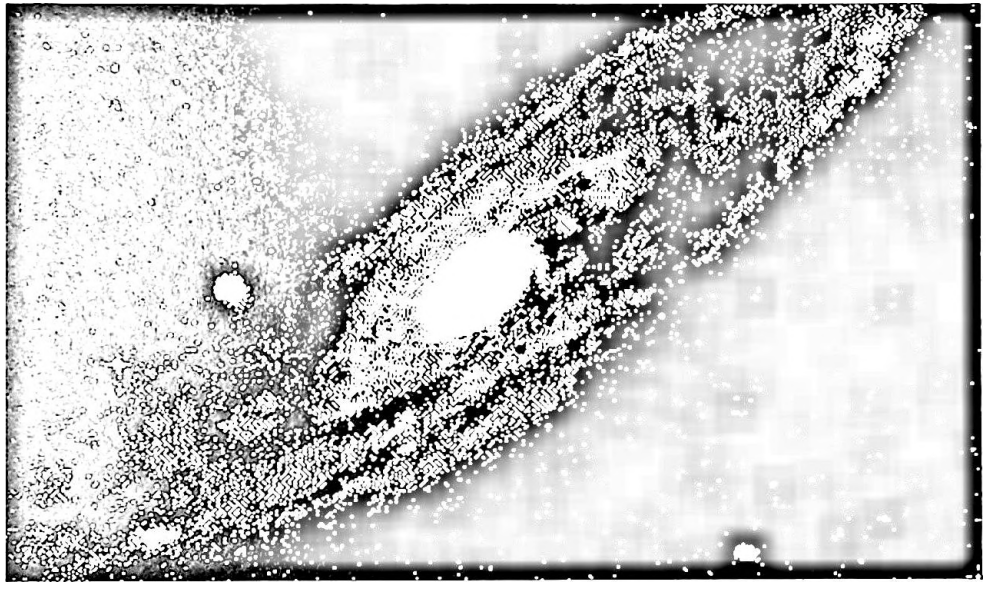
Error Messages

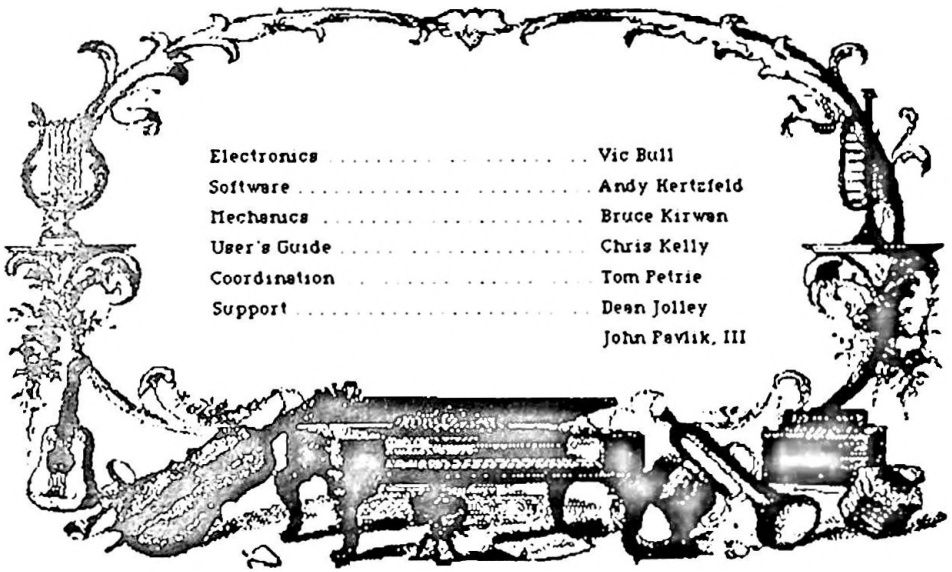
If you see the message "The Scanner is not responding", check the cable and connections to be sure they're properly connected. The switch on the adapter box must be in the Scan position. Make sure you've checked and adjusted the scanner's focus. If you're trying to scan bidirectionally, you must have the white edge tape installed. Check for dust or obstructions in the "nose" of the scanner cartridge.

If you see the message "Sorry, a system error occured", make a note about the ID number in the message box and try restarting your Mac and reloading ThunderScan. You may have a defective disk. Try your scanner on another Macintosh and see if you get the same message.

Returning Your Scanner for Service

If it's necessary to return your scanner for service, please call Thunderware and get a Return Material Authorization number (RMA). Our Customer Service representative will give you the information you need for shipping and service arrangements. Thunderware will not accept any unit shipped without the required RMA number.





Electronics	Vic Bull
Software	Andy Hertzfeld
Mechanics	Bruce Kirwan
User's Guide	Chris Kelly
Coordination	Tom Petrie
Support	Dean Jolley
	John Pavlik, III

Thunderware, Inc. Orinda, CA

Tutorial Image

Save for use with Chapter 2: **Learning ThunderScan**

This sheet is properly positioned when roller bar and rollers are in the location shown below.